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DESCRIPTIONS OF SIX NEW SPECIES OF *CARYOSPORA* (APICOMPLEXA: EIMERIIDAE) FROM GUATEMALAN SNAKES (SERPENTES: COLUBRIDAE AND VIPERIDAE)

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ABSTRACT: One hundred and seventy snakes were collected in Guatemala and examined for coccidia. Of these, 8 individuals representing 6 host species were positive for *Caryospora* spp., 6 of which are described as new species. Sporulated oocysts of *Caryospora bothriechis* n. sp. from *Bothriechis aurifer* are spheroidal to subspheroidal, 12.7 × 12.5 (12–14 × 12–13) μm, with a length/width (L/W) ratio of 1.0; they lack a micropyle (M) or oocyst residuum (OR), but 1 large polar granule (PG) is usually present. Sporocysts are ovoidal, 9.0–7.5 (8–10 × 7–8) μm, and have a L/W ratio of 1.2, and a Stieda body (SB) and sporocyst residuum (SR). Oocysts of *Caryospora coniophanis* n. sp. from *Coniophanes imperialis* are spheroidal to subspheroidal, 18.8 × 18.1 (17–20.5 × 16–20) μm, with a L/W ratio of 1.0; they lack a M and OR, but 1 large PG is usually present. Sporocysts are ovoidal, 13.2 × 9.4 (12–15 × 8–10) μm with a L/W ratio of 1.4, and a SB, substieda body (SSB), and SR. Oocysts of *Caryospora conophae* n. sp. from *Conophis lineatus* are spheroid to subspheroidal, 20.4 × 19.5 (17–26 × 17–25) μm, with a L/W ratio of 1.0; they lack a M and OR, but 1 large PG is usually present. Sporocysts are ovoidal, 13.1 × 9.8 (11–15 × 8–11) μm with a L/W ratio of 1.3 and a SB, SSB, and SR. Oocysts of *Caryospora guatemalensis* n. sp. from *Lampropeltis triangulum* are spheroidal to subspheroidal, 23.9 × 23.2 (20–27 × 20–26) μm, with a L/W ratio of 1.0; they lack a M and OR, but 1 large PG is usually present. Sporocysts are ovoidal, 14.4 × 10.6 (13–18 × 9–13) μm, with a L/W ratio of 1.4 and a SB, SSB, and SR. Oocysts of *Caryospora mayorum* n. sp. from *Conophis lineatus* are spheroidal to subspheroidal, 25.6 × 24.4 (24–27 × 24–25) μm, with a L/W ratio of 1.0; they lack a M and OR, but 1 large PG is usually present. Sporocysts are ovoidal, 16.3 × 11.9 (16–18 × 11–13) μm, with a L/W ratio of 1.4 and a SB, SSB, and SR. Oocysts of *Caryospora zacapensis* n. sp. from *Masticophis mentovarius* are spheroidal to subspheroidal, 22.5 × 21.8 (19–25 × 18–25) μm, with a L/W ratio of 1.0; they lack a M and OR, but 1 large PG is usually present. Sporocysts are ovoidal, 14.6 × 11.4 (11–16 × 10–13) μm, with a L/W ratio of 1.3 and a SB, SSB, and SR.

Twenty-seven species of *Caryospora* Léger, 1904 (Apicomplexa: Eimeriidae) have been described from serpentine hosts (Reptilia: Serpentes) (Nandi, 1985; Matuschika, 1986a, 1986b; Upton et al., 1986, 1989; Lainson et al., 1991; Upton, Freed, and Freed, 1992; Upton, McAllister et al., 1992; Modry and Koudela, 1994, 1997, 1998; Upton et al., 1994; McAllister et al., 1995; Wilber et al., 1995; Modry et al., 1997, 1999, 2002; Telford, 1997; Daszak and Ball, 2001). Of these, 6 have been reported from Africa, 3 from Asia, 2 from Australia, 1 from Europe, 2 from India, 3 from the Middle East, 7 from North America, and 3 from South America. No species has been reported from endemic snakes from more than a single continent and there are no reports of *Caryospora* from Central America. Here, we provide the first report of *Caryospora* spp. from Central America and describe 6 new species recovered from snakes collected during a biotic survey in Guatemala.

MATERIALS AND METHODS

Snakes were collected from diverse environments, ranging from high mountains to low tropical forests during the seasonal rains of 1998–2000 between late May and mid-July. Captured individuals were identified to species, killed, and necropsied; preserved hosts were deposited in The University of Texas at Arlington (UTA) herpetological collection, Arlington, Texas. Contents of the large intestine were placed in 2.5% (w/v) aqueous potassium dichromate ($K_2Cr_2O_7$) solution and stored at ambient temperature to allow oocyst sporulation until processed for coccidia using the method described by Duszynski and Wilber (1997). Oocysts were identified based on standard morphologic features of the sporulated oocyst. All measurements are reported in micrometers (μm). Standardized abbreviations for oocyst and sporocyst characters, with 1 exception (sporozoites = SZ), are those recommended by (Wilber et al., 1998) including oocyst characters: length (L), width (W), their ranges and ratio (L/W), micropyle (M), residuum (OR), polar granules (PG); sporocyst characters: length (L), width (W), their ranges and ratio (L/W), Stieda body (SB), substieda body (SSB), parastieda body (PSB), residuum (SR), sporozoites (SZ), refractile bodies (RB), and nucleus (N). Representative photomicrographs of sporulated oocysts were accessioned in the U.S. National Parasite Collection (USNPC), Beltsville, Maryland. Comparisons of recovered oocysts from colubrid snakes to named *Caryospora* are limited to species occurring in the Western Hemisphere, as there are no reports of species occurring in wild hosts in both hemispheres and it is unlikely that any of the *Caryospora* spp. of snakes have global distributions.

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RESULTS

Overall, 170 snakes representing 6 families (Boidae [n = 3], Colubridae [127], Elapidae [7], Leptotyphlopidae [2], Loxocemidae [1], Viperidae [30]) from Guatemala were collected and examined. Of these, 8 (4.7%) individuals representing 6 host species from 2 families (Colubridae and Viperidae) had oocysts consistent with *Caryospora* spp. present in their feces and/or large intestines; these hosts included *Bothriechis aurifer* (Salvin, 1860), *Coniophanes imperialis* (Kennicott in Baird, 1859), *Conophis lineatus* (Duméril, Bibron and Duméril, 1854), *Lampropeltis triangulum* (Lacépède, 1789), *Masticophus mentovarius* (Duméril, Bibron & Duméril, 1854), and *Porthidium ophryomegas* (Bocourt, 1868).

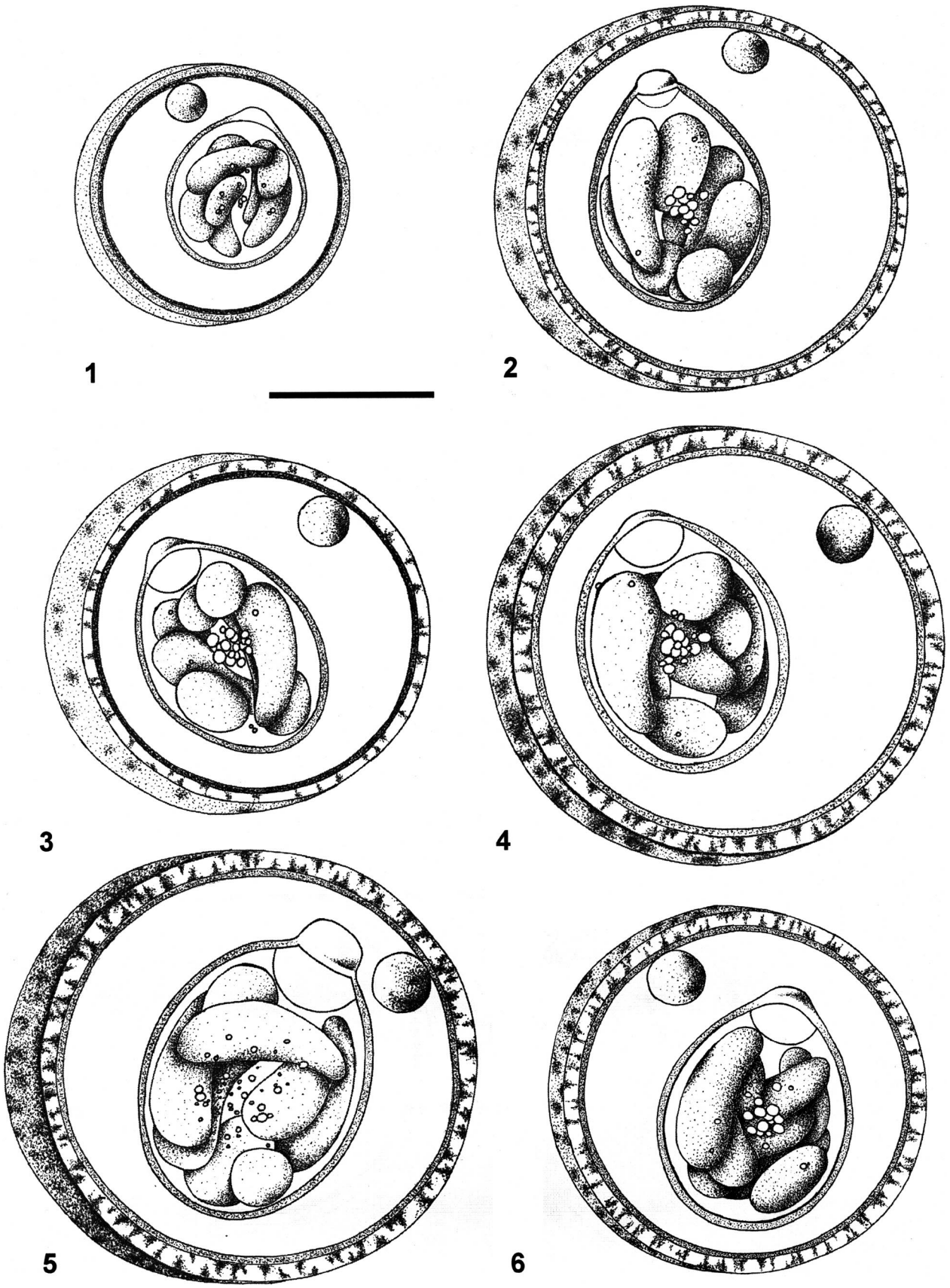
DESCRIPTION

Caryospora bothriechis sp. n.

(Figs. 1, 7–9)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 0.8; wall characteristics, outer layer light colored, smooth and 1/2 to 2/3 total wall thickness, inner layer dark; L × W (n = 15), 12.7 by 12.5 (12–14 × 12–13); L/W ratio, 1.0; M and OR, absent; PGs, 1 refractile, and usually adjacent to inner wall of oocyst. Distinctive features of oocyst, small size and large PG.

Description of sporulated sporocyst and sporozoites: Sporocyst shape, ovoidal; L × W, 9.0 × 7.5 (8–10 × 7–8); L/W, 1.2; SB, present, faint and clear; SSB, absent; PSB, absent; SR, present; SR characteristics, few dispersed small granules; SZ, sausage-shaped; RB, not observed; N, not observed. Distinctive features of sporocyst, none.



FIGURES 1–6. Composite line drawings of sporulated oocysts of *Caryospora* spp. from snakes collected in Guatemala. (**1**) *Caryospora bothriechis*. (**2**) *Caryospora coniophanis*. (**3**) *Caryospora conophae*. (**4**) *Caryospora guatemalensis*. (**5**) *Caryospora mayorum*. (**6**) *Caryospora zacapensis*. Scale bar = 10μm.

Taxonomic summary

Type host: Bothrieches aurifer (Salvin, 1860).

Type locality: Central America: Guatemala: Baja Verapaz: Cerro Verde, near La Unión Barrios, 15°22.37′N, 89°48.91′W.

Geographic distribution: Central America: Guatemala.

Prevalence: One of 3 (33%) in type host.

Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC 95788. Symbiotype deposited in the UTA R-46659.

Etymology: The nomen triviale is derived from the host genus from which the parasite species was isolated and -is (L., of this genus).

Remarks

There are no reports of *Caryospora* sp. from *Bothrieches* sp. The only caryosporan previously described from snakes in the Viperidae is *Caryospora simplex* Léger, 1904, originally described from *Vipera aspis* in France and redescribed by Upton et al. (1983), from captive *Vipera xanthina* from the Atlanta Zoo, Atlanta, Georgia. It has also been recovered from *Vipera berus*, *Vipera ammodytes* (Modry et al., 1997), and *Vipera kaznakovi* (Matuschika, 1986a) in Europe, and captive *V. kaznakovi* at the Rio Grande Zoological Park, Albuquerque, New Mexico (Wilber et al., 1995) and *Vipera russelli* at the LaFayette Zoo, Louisiana (Upton, 1986). *Caryospora bothriechis* is smaller than *C. simplex* (12.7 × 12.5 vs. 14.9 × 14.9); has a thinner oocyst wall (0.8 vs. 1.4) and a smaller SP (9.0 × 7.5 vs. 11.6 × 8.9); lacks a SSB; and has an SR consisting of a few dispersed granules compared with numerous granules of varying size.

Caryospora coniophanis sp. n.

(Figs. 2, 10–12)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 1.3; wall characteristics, outer layer yellow/brown, pitted, and 2/3 of total thickness, inner layer dark; L x W (n = 10), 18.8 × 18.1 (17–20.5 × 16–20); L/W ratio, 1.0; M and OR, absent; PGs, present, 1 large, refractile and usually adjacent to inner wall of oocyst. Distinctive features of oocyst, large PG.

Description of sporocyst and sporozoites: Sporocyst shape, ovoidal; L × W, 13.2 × 9.4 (12–15 × 8–10); L/W ratio, 1.4; SB, present; SSB, present; PSB, absent; SR, present; SR characteristics, central compact granular mass with few dispersed small granules; SZ, sausage-shaped, lies curled around central SR; RB, not observed; N, not observed. Distinctive features of sporocyst: none.

Taxonomic summary

Type host: Coniophanes imperialis (Kennicott in Baird, 1859).

Type locality: Central America: Guatemala: Petén: in front of Biotopo Cerro Cahuí, 16°58.82′N, 89°42.30′W.

Geographic distribution: Central America: Guatemala.

Prevalence: One of 1 (100%) in type host.

Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC 95789. Symbiotype deposited in the UTA R-50292.

Etymology: The nomen triviale is derived from the host genus from which the parasite species was isolated and -is (L., of this genus).

Remarks

There are no reports of *Caryospora* sp. from *Coniophanes* sp. There are 25 species of *Caryospora* described from the Colubridae, with 12 reported from the Western Hemisphere. Of these, *C. coniophanis* is similar to *Caryospora tantillae* Telford 1997 and *Caryospora relictae* Telford, 1997, both described from *Tantillae relicta* in Florida. However, it is smaller than *C. tantillae* (oocyst 18.8 × 18.1 vs. 19.6 × 18.9; SP 13.2 × 9.4 vs. 15.1 × 11.6); has a prominent refractile PB adjacent/attached to the oocyst wall; and the SP is smaller relative to the oocyst than in the figures accompanying the description of *C. tantillae*. *Caryospora coniophanis* is similar in size to *C. relictae* (oocyst: 18.8 × 18.1 vs. 18.5 × 17.6). However, the oocyst outer wall is lightly pitted and thicker than the inner; the sporocyst is smaller (13.2 × 9.4 vs. 14.8 × 11.4); and the SB and SSB are more prominent than appears in the figures accompanying the description of *C. relictae*.

Caryospora conophae sp. n.

(Figs. 3, 13–15)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 1.4; wall characteristics, outer, yellow brown, pitted and 2/3 total thickness, inner clear; L × W (n = 20), 20.4 × 19.5 (17–26 × 17–25); L/W ratio, 1.0; M and OR, absent; PGs, present, 1 large, refractile and usually adjacent to inner wall of oocyst. Distinctive features of oocyst, large PG.

Description of sporocyst and sporozoites: Sporocyst shape, ovoidal; L × W, 13.1 × 9.8 (11–15 × 8–11); L/W ratio, 1.3; SB, present, nipple-like: SSB, present; PSB, absent; SR, central compact granular mass with few dispersed small granules; SZ, sausage-shaped, 8–10 × 2–3, lies curled around central SR; RB, not observed; N, not observed. Distinctive features of sporocyst, none.

Taxonomic summary

Type host: Conophis lineatus (Dumeril, Bibron, and Dumeril, 1854).

Type locality: Central America: Guatemala: Zacapa: San Vicente: Aldea El Arenal, 14°10.05′N, 90°58.01′W.

Geographic distribution: Central America: Guatemala.

Prevalence: Three of 4 (75%) in type host.

Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC 95790. Symbiotype deposited in the UTA R-46849.

Etymology: The nomen triviale is derived from the host genus from which the parasite species was isolated and -ae (L., of this genus).

Remarks

There are no reports of *Caryospora* from *Conophis* sp. Of the species described and reported from colubrid snakes in the Western Hemisphere, *C. conophae* is most similar to *C. tantillae*. However, it differs in being larger (oocyst 20.4 × 19.5 vs. 19.6 × 18.9); having a thick, brownish 2-layered oocyst wall with the exterior slightly pitted; possessing a distinct large PB adjacent or attached to the inner oocyst wall; and having a smaller SP (13.1 × 9.8 vs. 15.1 × 11.6).

Caryospora guatemalensis n. sp.

(Figs. 4, 16–18)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 1.9; wall characteristics, outer, yellow brown, pitted and approximately 3/4 of total thickness, inner dark; L × W (n = 11), 23.9 × 23.2 (20–27 × 20–26); L/W ratio, 1.0; M and OR, absent; PGs, present, 1 large, refractile and usually adjacent to inner wall of oocyst. Distinctive features of the oocyst, thick, pitted wall and large PG.

Description of sporocyst and sporozoites: Sporocyst ovoidal; L × W: 14.4 × 10.6 (13–18 × 9–13); L/W: 1.4; SB: prominent, nipple-like; SSB: present; PSB: absent; SR: present; SR characteristics, central compact granular mass with few dispersed small granules; SZ, sausage-shaped, lies curled around central SR; RB, not observed; N, not observed.

Taxonomic summary

Type host: Lampropeltis triangulum (Lacépède, 1789).

Type locality: Central America: Guatemala: Izabal: Morales: Sierra de Caral: Finca San Silvestre, no geographic coordinates available.

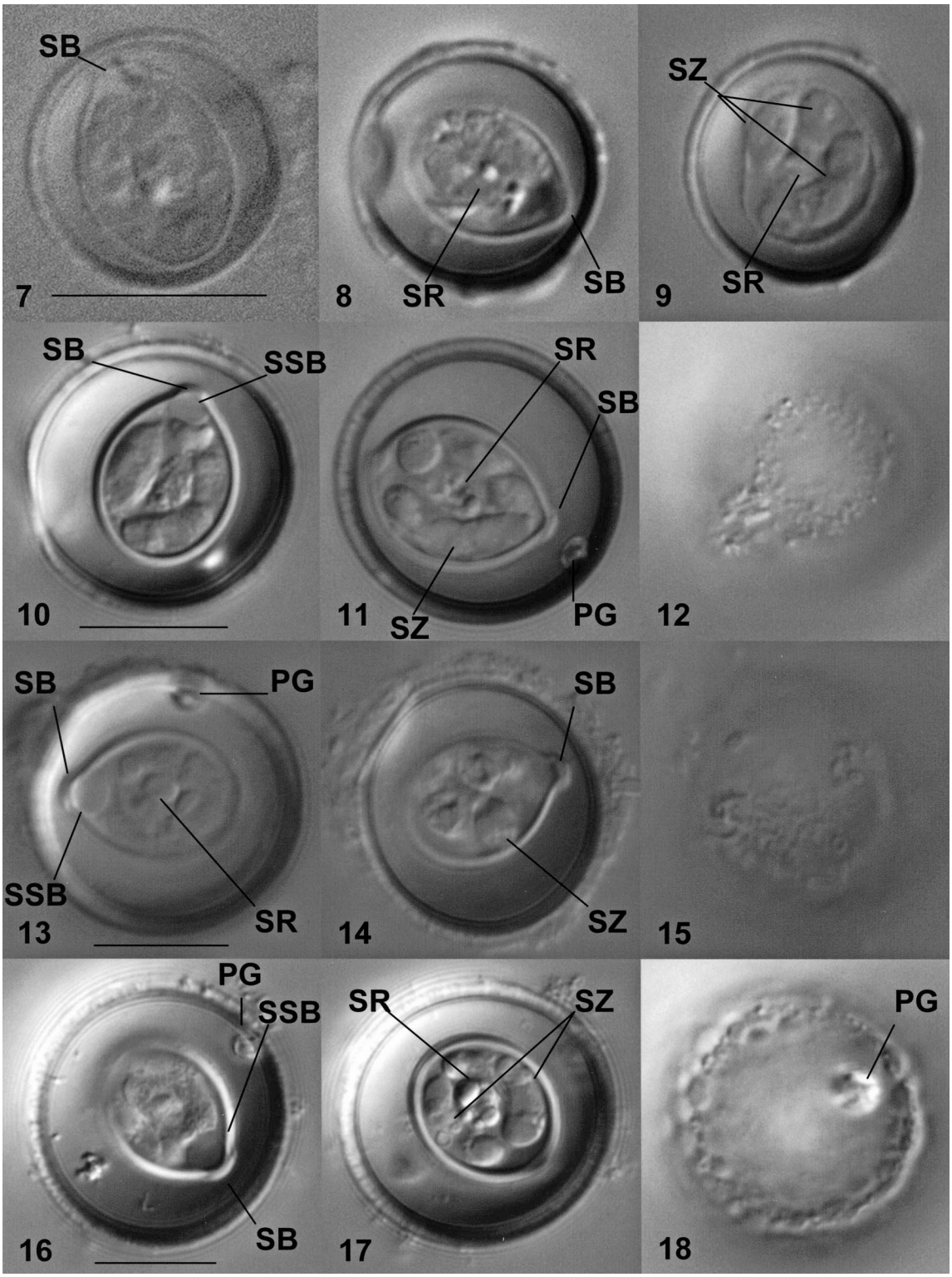
Geographic distribution: Central America: Guatemala.

Prevalence: One of 2 (50%) in type host.

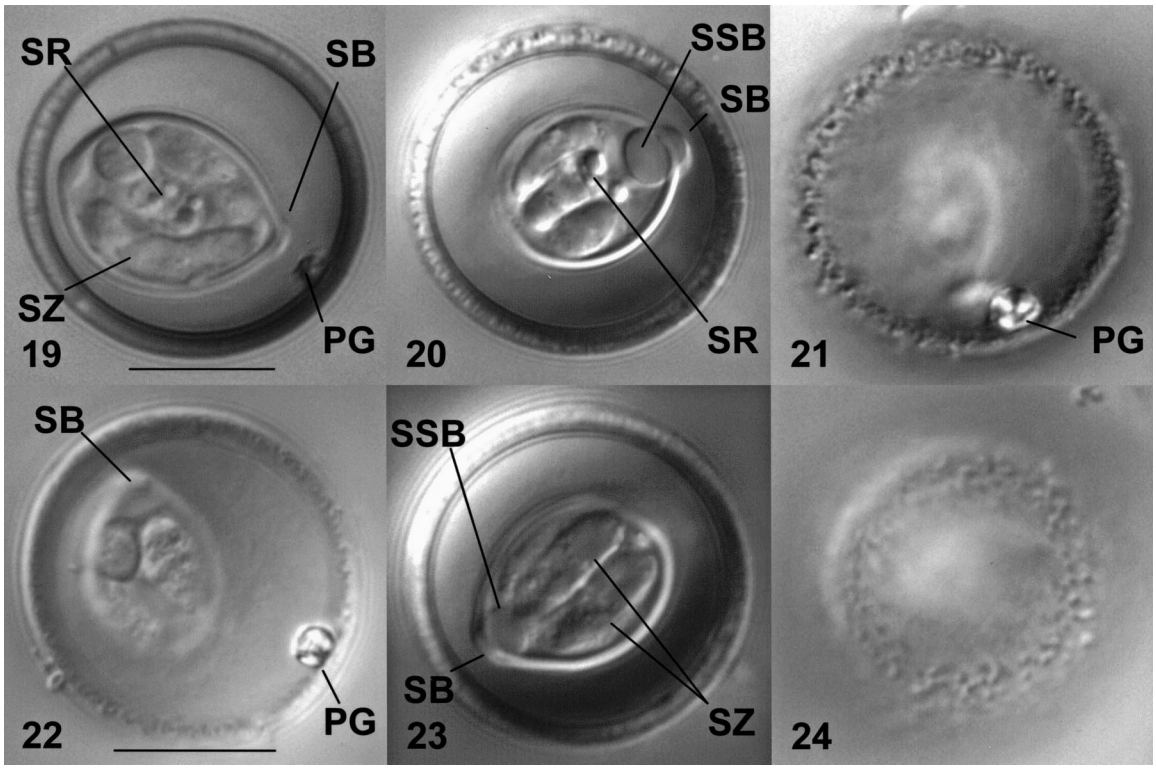
Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC 95791. Symbiotype deposited in the UTA R-46688.

Etymology: The nomen triviale is derived from the country from which the parasite species was isolated and -ensis (L., belonging to).



FIGURES 7–18. Photomicrographs of sporulated oocysts of *Caryospora* spp. from snakes collected in Guatemala (PG, polar granule; SB, Stieda body; SSB, substieda body; SR, sporocyst residuum; SZ, sporozoites). (**7**) *Caryospora bothriechis* clear SB. (**8**) SB and dispersed SR. (**9**) Central compact SR and sausage-shaped SZ. (**10**) *Caryospora coniophanis* SB and SSB. (**11**) PG adjacent to inner oocyst wall, SB, central compact SR, and sausage-shaped SZ. (**12**) Pitted oocyst wall. (**13**) *Caryospora conophae* PG adjacent to inner oocyst wall, SB, SSB, and central SR. (**14**) SB and SZ. (**15**) Pitted oocyst wall. (**16**) *Caryospora guatemalensis* with PG adjacent to inner oocyst wall, SB, and SSB. (**17**) Central compact SR and SZs. (**18**) Pitted oocyst wall.



FIGURES 19–24. (**19**) *Caryospora mayorum* PG adjacent to inner oocyst wall, SB, central compact SR, and sausage-shaped SZ. (**20**) SB, SSB, and dispersed SR. (**21**) Pitted oocyst wall. (**22**) *Caryospora zacapensis* PG adjacent to inner oocyst wall and SB. (**23**) SB, SSB, and sausage-shaped SZ. (**24**) Pitted oocyst wall. Scale bar = 10μm for figures in each row.

Remarks

Caryospora lampropeltis Anderson, Duszynski, and Marquardt, 1968 was originally described from *Lampropeltis calligaster* collected in Illinois and has also been reported from *Lampropeltis getula* from Texas and *Lampropeltis triangulum* from Arkansas (Anderson et al., 1968; McAllister et al., 1995). Although similar in many respects, *C. guatemalensis* differs from *C. lampropeltis* by having a heavily pitted, striated outer oocyst wall; a more prominent SSB than depicted in the figures with the original description; and a smaller SP (14.4 × 10.6 vs. 17.1 × 12.3). Of the other species described from colubrid snakes in the Western Hemisphere, *C. guatemalensis* is similar to *Caryospora gracilis* Upton, McAllister, Trauth, and Bibb, 1992, described from *Tantilla gracilis* collected in Texas. *Caryospora guatemalensis* differs from *C. gracilis* in having a thicker, heavily pitted and striated outer oocyst wall (compared with figures accompanying description); it lacks an OR; has a smaller SP (14.4 × 10.6 vs. 17.1 × 12.7); and the SR is composed of few dispersed granules versus a large condensed mass of granules.

Caryospora mayorum **n. sp.**
(Figs. 5, 19–21)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 2.4; wall characteristics, outer, yellow/brown with heavy pitting and approximately 3/4 total thickness, inner yellow/brown; L × W (n = 5), 25.6 × 24.4 (24–27 × 24–25); L/W ratio, 1.0; M and OR, absent; PGs, present, 1 large, refractile and usually adjacent to inner wall of oocyst. Distinctive features of oocyst, thick, pitted wall and large PG.

Description of sporocyst and sporozoites: Sporocyst shape, ovoidal; L × W, 16.3 × 11.9 (16–18 × 11–13); L/W ratio, 1.4; SB, present; SSB, present; SR, present; SR characteristics, central mass with few dispersed granules; SZ, sausage-shaped; RB, not observed; N, not observed. Distinctive features of sporocyst, none.

Taxonomic summary

Type host: Conophis lineatus (Dumeril, Bibron, and Dumeril, 1854).

Type locality: Central America: Guatemala: Zacapa: San Vicente: Aldea El Arenal, 14°10.05′N, 90°58.01′W.

Geographic distribution: Central America: Guatemala.

Prevalence: One of 4 (25%) in type host.

Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC No. 95792. Symbiotype deposited in the UTA R-46852.

Etymology: The nomen triviale is derived from the native Mayan peoples of Guatemala and -orum (L., of the).

Remarks

There are no reports of *Caryospora* sp. from *Conophis* sp. Of the species described from colubrid snakes in the Western Hemisphere, *C. mayorum* is similar to *Caryospora duszynskii* Upton, Current, and Bernard, 1984, described from *Elapha guttata* collected in Georgia. However, *C. conophensis* has a thicker oocyst wall (2.4 vs. 1.5), a single PB versus 1–2, a smaller SP (16.3 × 11.9 vs. 18.3 × 14.8), and a more prominent SSB than is depicted in the figures provided with the original description.

Caryospora zacapensis **n. sp.**
(Figs. 6, 22–24)

Description of sporulated oocyst: Oocyst shape, spheroidal to subspheroidal; number of walls, 2; wall thickness, 1.7; wall characteristics, outer, yellow/brown, lightly pitted and approximately 1/2 to 3/4 total wall thickness, inner, dark; L × W (*N* = 48), 22.5 × 21.8 (19–25 × 18–25); L/W ratio, 1.0; M and OR, absent; PGs, 1 large (rarely absent), refractile and usually adjacent to inner wall of oocyst. Distinctive features of oocyst, none.

Description of sporocyst and sporozoites: Sporocyst shape, ovoidal;

L × W, 14.6 × 11.4 (11–16 × 10–13); L/W ratio: 1.3; SB, present; SSB, present; SR, present; SR characteristics, central mass and few dispersed granules; SZ, sausage-shaped, lies curled around central SR mass; RB, not observed; N, not observed. Distinctive features of sporocyst, none.

Taxonomic summary

Type host: Masticophus mentovarius (Duméril, Bibron, and Duméril, 1854).

Type locality: Central America: Guatemala: Zacapa: San Vicente: Aldea El Arenal, 14°10.05′N, 90°58.01′W.

Geographic distribution: Central America: Guatemala.

Prevalence: Two of 2 (100%).

Site of infection: Unknown, oocysts collected from intestinal contents and feces.

Specimens deposited: Photosyntypes of sporulated oocyst in the USNPC No. 95793. Symbiotype deposited in the UTA R-46724.

Etymology: The nomen triviale is derived from the Guatemalan department of Zacapa, where the parasite species was isolated, and -ensis (L., belonging to).

Remarks

There is 1 report of a *Caryospora* sp. from *Masticophis* sp. *Caryospora masticophis* Upton, McAllister, and Trauth, 1994, was originally described from *Masticophis flagellum* collected in Arkansas. *Caryospora zacapensis* differs from this species in being larger (oocyst: 22.5 × 21.8 vs. 13.6 × 13.5; sporocyst: 14.6 × 11.4 vs. 10.9 × 8.1), and having a thicker oocyst wall (1.7 vs. 1.0) that is lightly pitted versus smooth. Of the species described from colubrid snakes in the Western Hemisphere, *C. zacapensis* is similar to *Caryospora lampropeltis* described from *Lampropeltis calligaster* collected in Illinois. *Caryospora zacapensis* differs in being smaller (oocyst: 22.5 × 21.8 vs. 23.3 × 23.3; SP: 14.6 × 11.4 vs. 17.1 × 12.3) and having a more prominent SSB.

DISCUSSION

In addition to the new species described, 1 oocyst consistent with *Caryospora* sp. was recovered from a single *Porthidium oryphomegas* collected in San Vicente, Zacapa, Guatemala (14°10.05′N, 90°58.01′W). The oocyst was spheroidal to subspheroidal. The oocyst wall was 1.1 thick, 2 layered, with the outer layer thick and smooth. Oocyst L × W was 20.65 × 19.8 with L/W = 1.0. There was no M or OR. A PG was present that was large, refractile, and attached to the inner wall of the oocyst. Sporocysts were ovoidal and measured 13.0 × 10.3 with L/W = 1.25. The SB was distinct, but no SSB was observed. The SR consisted of a central mass and dispersed small granules, and the SZs were sausage-shaped and curled around the central SR mass. There are no reports of *Caryospora* sp. from *Porthidium* sp. In addition to *C. bothriechis* described above, the only caryosporan previously described from snakes in the Viperidae is *C. simplex*. The *Caryospora* sp. recovered is larger than both previously known species (oocyst: 20.65 × 19.8 vs. 12.7 × 12.5 [*C. bothriechis*] and 14.9 × 14.9 [*C. simplex*]; SP: 13.0 × 10.3 vs. 9.0 × 7.5 and 11.6 × 8.9). However, because we recovered only a single oocyst and were unable to obtain a photomicrograph of the specimen, we do not designate a species name at this time and will wait until recovery of additional oocysts to develop a complete description. A symbiotype of the host has been deposited in the UTA R-46723.

Comparisons of new caryosporan species from Guatemalan colubrid snakes to named *Caryospora* spp. are limited to species occurring in the Western Hemisphere, as there are no reports of species occurring in both hemispheres and it is unlikely that any of the *Caryospora* of snakes have global distributions. *Caryospora simplex* from viperid snakes has been recovered in both Eastern and Western Hemispheres. However, findings in the west are limited to captive snakes native to the Eastern Hemisphere (Upton et al., 1983; Wilber et al., 1995).

As of 1 January 2005, there are 2,978 species of snakes recognized, with 1,827 species in the Colubridae and 259 in the Viperidae (EMBL Reptile Database, 2005, http://www.embl-heidelberg.de/~uetz/LivingReptiles.html). Of these, 33 species of *Caryospora* have been documented infecting 28 species, including those described in this report. The small number of hosts surveyed suggests that caryosporan diversity remains poorly known.

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